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FOUR TEST-DEMONSTRATIONS OF

Hardwood Log Grades

IN THE NORTHEAST

BY

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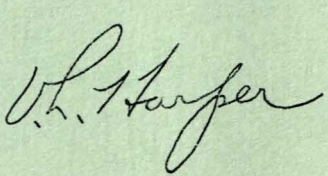
F O R E W O R D

The Research and Marketing Act of 1946 (Title II, Section c) directed the Secretary of Agriculture "to develop and improve standards of quality, condition, quantity, grade, and packaging, and recommend and demonstrate such standards in order to encourage uniformity and consistency in commercial practices." In the list of commodities to which this directive applies are forest products.

In the marketing of forest products, the development and use of quality standards have lagged far behind. It is time that vigorous efforts be made to catch up with practices that have long been taken for granted in the marketing of most other commodities.

The Northeastern Forest Experiment Station, in cooperation with mill owners, has initiated a series of test-demonstrations in the grading of hardwood logs. This report summarizes the results of tests made in Pennsylvania, West Virginia, and Maine.



V. L. Harper
Director

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FOUR TEST-DEMONSTRATIONS OF HARDWOOD LOG GRADES IN THE NORTHEAST

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INTRODUCTION

FARMERS DON'T SELL prime steers for the same price per pound as canner cows. Lumber dealers don't sell top-quality boards for the same price as Number 3 Common. If you are a timber owner, why should you sell hardwood trees or logs without considering their quality? Logs that yield a high proportion of their volume in the better grades of lumber are certainly worth more than those that yield a low proportion of good-quality material.

Of course there has always been some recognition by timber operators of the differences in hardwood timber quality. In the earliest cuttings, only the best trees were harvested. In each successive cut the quality standards became less exacting. Under present conditions, the bulk of the material is of low quality. Operators feel that they need the small proportion of better-quality logs to "sweeten the lump."

This practice often turns out to be poor business for both the buyer and the seller. Forest-land owners and lum-

bermen are beginning to realize the need for precise determinations of timber values.

Many signs of this changing attitude have appeared in the Northeast. Lacking a commonly recognized system of hardwood log grading, stop-gap methods have been employed. Some sawmills pay more for logs that exceed a certain diameter. Others pay a premium for butt logs. Longer logs may sometimes bring a higher price than short logs. The number and size of log defects are occasionally recognized in the specifications for acceptable material.

THE LOG-GRADING SYSTEM

MANY OF THE ATTEMPTS at hardwood log grading have met with indifferent success. This is due primarily to failure to recognize and evaluate all the factors that influence the value of individual logs. Size, straightness, and soundness are important grading factors, but the least understood and most important of all is the pattern of defects.

A log-grading system must first of all relate logs to the product that is to be cut from them. Generally three use classes are recognized: factory, structural, and local-use logs. Factory logs must be suited to producing factory lumber, structural logs to producing structural timbers and ties, and still other logs to producing pieces such as industrial blocking, ship dunnage, and so forth. Once use classes are recognized, grades within the use classes can be established. Low-grade logs in one class may be high grade in another class and may be worth just as much money.

The Forest Products Laboratory[1] has recognized use classes and has prepared for the factory use class a universal system for grading hardwood logs that are to be manufactured into standard or factory hardwood lumber. This system is proving to be workable and easy to understand. The grading rules in this system were developed from intensive mill

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[1] U.S. FOREST PRODUCTS LABORATORY. HARDWOOD LOG GRADES FOR STANDARD LUMBER. PROPOSALS AND RESULTS. U.S. FOREST PROD. LAB. RPT. D1737. 60 PP., ILLUS. MADISON, WIS. 1949.

studies of the relationships between surface characteristics of logs and the grades of lumber sawed from them.

It was found that the accepted hardwood lumber-grading system could be modified for log-grading purposes by dividing the log into four equal faces (fig. 1) and evaluating each face as though it were a board.

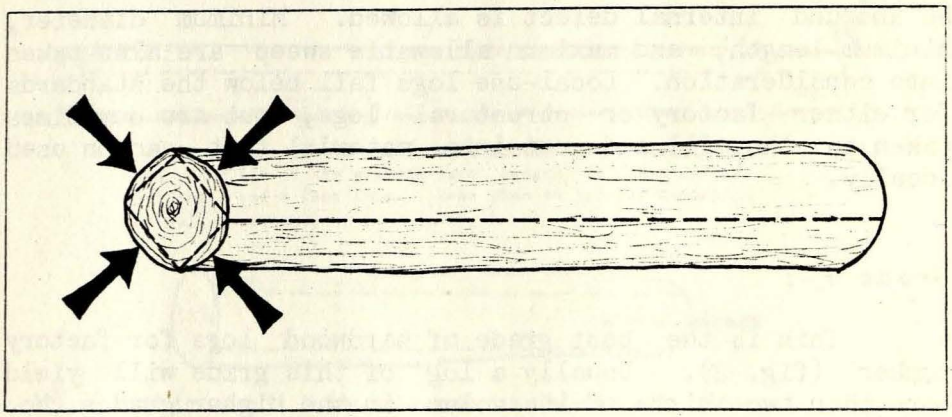


Figure 1.--The grading faces used in grading hardwood sawlogs. Each face is judged as though it were a board.

Experience has indicated that the poorest of the four faces can be disregarded. The grade determination is made on the basis of the poorest of the three other faces. We call this the "grading face." In general, the factors to be taken into account include anything that limits the clear sections of the grading face.

Knots are clearly evident, but the grader needs some practice before he can detect some of the other surface indicators of interior defects. The grader examines the ends of the logs for indications of internal defect such as mineral stain, shake, worm holes, and the like. Minimum diameter, minimum length, and maximum allowable sweep of the log must also be taken into account. The grader must also make a reasonably accurate estimate of the fraction of gross volume that will be lost in cutting out the defective (cull) material.

Following the establishment of log grades for hardwood logs used in the production of standard factory lumber, it was found that two other use classes of logs should be recognized: namely, logs suitable for the production of high-grade structural material, and lower-quality logs from which material for miscellaneous local use can be produced. Neither of these classes meets the minimum standards of clear cuttings established for factory-class logs. Structural logs are graded on factors that affect the strength of the material--such as size of defects and soundness of heart. No unsound internal defect is allowed. Minimum diameter, minimum length, and maximum allowable sweep are also taken into consideration. Local-use logs fall below the standards for either factory or structural logs, but are sometimes taken to the mill and cut into material that can be used locally.

Grade F-1

This is the best grade of hardwood logs for factory lumber (fig. 2). Usually a log of this grade will yield more than two-thirds of its volume in the higher grades (No. 1 Common or better) of standard factory lumber.

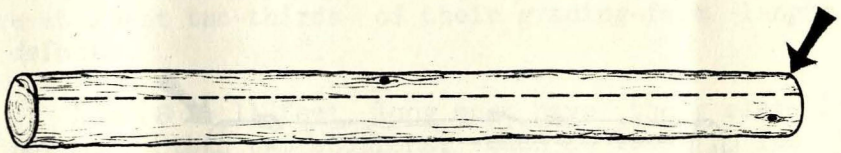
A butt log may have a diameter as small as 13 inches inside the bark at the small end of the log and still qualify for this grade. Other logs must be at least 16 inches in diameter inside the bark at the small end. All logs must be 10 feet or longer to qualify, and must have at least five-sixths of their grading-face length clear of defect or indicators of defect.

This clear length must occur in not more than two sections. The minimum length of these sections varies according to the diameter of the log: Logs 13 to 15 inches in diameter must have clear sections at least 7 feet long; logs 16 to 19 inches, 5 feet; logs 20 inches or larger, 3 feet. Logs in this grade may have up to 15 percent deduction for sweep but not more than 40 percent combined deduction for sweep and cull.

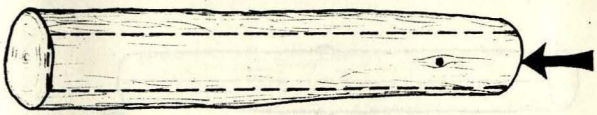
Grade F-2

This is the second-best grade of hardwood logs for factory lumber (fig. 3). Usually a log of this grade will

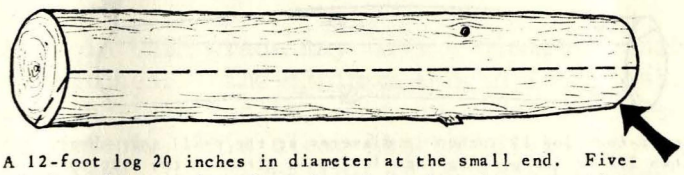
GRADE F-1



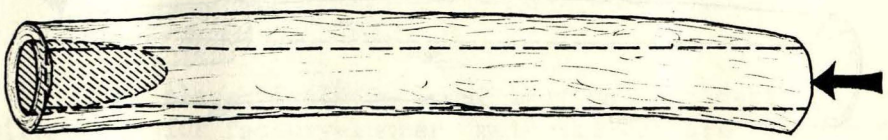
A 16-foot butt log 13 inches in diameter at the small end. More than 5/6 of its grading-face length is clear in two sections 7 and 8 feet long. Less than 40 percent deduction for cull or sweep.



A 10-foot log 16 inches in diameter at the small end. More than 5/6 of its grading-face length is clear in one section 8 feet long. Less than 15 percent deduction for sweep; total cull deduction is less than 40 percent.



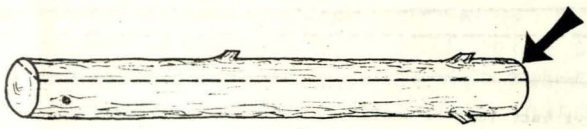
A 12-foot log 20 inches in diameter at the small end. Five-sixths of its grading-face length is clear in two sections 8 and 3 feet long. Deduction for cull and sweep is less than 40 percent.



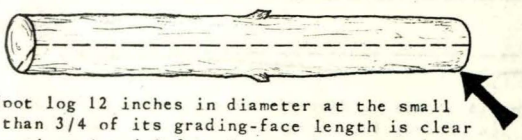
A 16-foot log 20 inches in diameter at the small end. Less than 15 percent deduction for sweep. Total deduction for sweep and rot is less than 40 percent. There are no surface indications of defect.

Figure 2.-- Four examples of Grade F-1 hardwood logs.

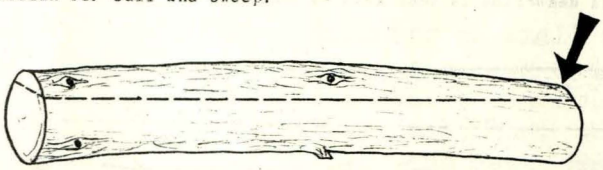
GRADE F-2



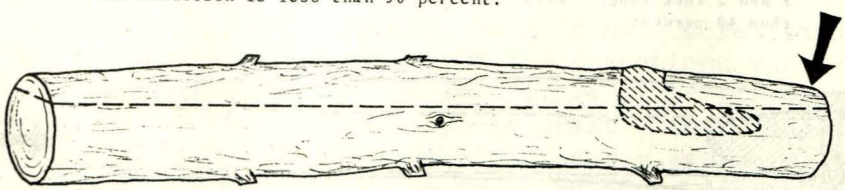
A 10-foot log 11 inches in diameter at the small end. More than 2/3 of its grading-face length is clear in two sections each 4 feet long. Less than 50 percent deduction for cull and sweep.



A 9-foot log 12 inches in diameter at the small end. More than 3/4 of its grading-face length is clear in two sections 4 and 3 feet long. Less than 50 percent deduction for cull and sweep.



An 11-foot log 18 inches in diameter at the small end. More than 2/3 of its grading-face length is clear in two sections 5 and 4 feet long. Deduction for sweep is 30 percent. Total deduction is less than 50 percent.



A 16-foot log 22 inches in diameter at the small end. More than 2/3 of its grading-face length is clear in three sections 4, 3, and 4 feet long. Less than 30 percent deduction for sweep. Total deduction is less than 50 percent.

Figure 3.--Four examples of Grade F-2 hardwood logs.

yield about one-half of its volume in the higher grades of standard factory lumber.

A log more than 10 feet long may have a diameter as small as 11 inches inside the bark at the small end and still qualify for this grade. Logs as short as 8 feet with a diameter of 12 inches or more are acceptable, provided at least three-fourths of the grading-face length is clear of defect or indicators of defect. Logs 10 feet or longer must have at least two-thirds of their grading-face length free of defect.

Logs 8 to 11 feet long must have their clear length in not more than two sections, each at least 3 feet long. Longer logs may have their clear length in not more than three sections, each at least 3 feet long. Logs in this grade may have up to 30 percent deduction for sweep but not more than 50 percent combined deduction for sweep and cull.

Grade F-3

This is the poorest grade of hardwood logs suitable for standard factory lumber (fig. 4). About one-third of the lumber yield from logs in this grade will be in the higher lumber grades.

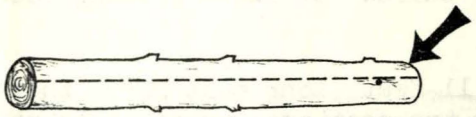
Logs in this grade may have a diameter inside bark as small as 8 inches. The minimum length is 8 feet. One-half of the grading-face length must be clear of defect or indicators of defect. This clear length may be in any number of 2-foot sections. A deduction of up to 50 percent for sweep alone or for a combination of sweep and cull is permissible.

Tie And Structural Grade

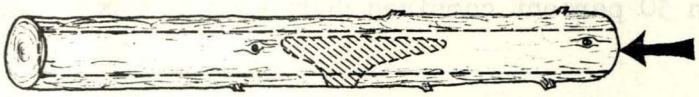
This class includes logs that do not meet the requirements for factory-lumber material but are usable for ties and heavy structural timbers. (fig. 5). Such logs are sound but they do not have enough clear length to qualify for grades F-1, F-2, or F-3.

Logs in this class must be sound and have no weakening defects such as large knots, split, or shake. A tie and structural log may be as small as 8 inches inside bark at the small end and as short as 8 feet. Sound knots are permitted if the diameter of the knot collar is not more than

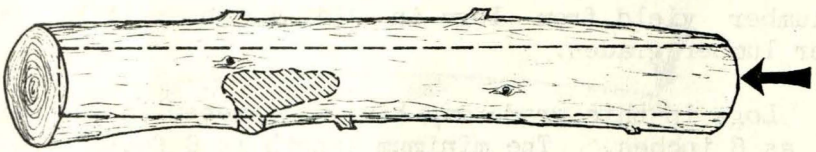
GRADE F-3



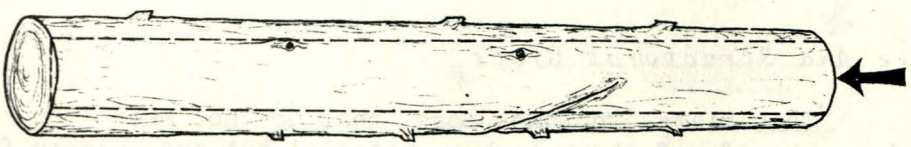
An 8-foot log 8 inches in diameter at the small end. More than 1/2 of its grading-face length is clear in two sections of 2 feet or longer. Less than 50 percent deduction for cull and sweep.



A 12-foot log 14 inches in diameter at the small end. More than 1/2 of its grading-face length is clear in two sections 4 and 2 feet long. Less than 50 percent deduction for sweep and rot.



A 14-foot log 22 inches in diameter at the small end. More than 1/2 of its grading-face length is clear in three sections 3, 3, and 4 feet long. Less than 50 percent deduction for sweep and rot.

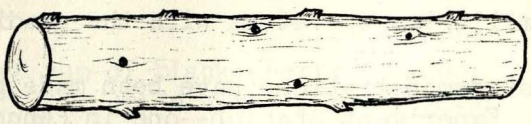


A 16-foot log 22 inches in diameter at the small end. One-half of its grading-face length is clear in three sections at least 2 feet long. Less than 50 percent deduction for sweep and rot.

Figure 4.--Four examples of Grade F-3 hardwood logs.

one-third of the log diameter at the point of occurrence. Any number of whorled knots occurring within 6 inches vertical distance are permitted if the aggregate of knot-collar diameters does not exceed one-third of the log diameter at

TIE AND STRUCTURAL GRADE



A 10-foot log 18 inches in diameter at the small end. It has numerous knots, but none with a knot collar exceeding 1/3 of the log diameter at the point where it occurs. No unsound defect. The log is straight; so there is no problem of sweep.

A 12-foot log 22 inches in diameter at the small end. This is a rough log with numerous knots and some sweep. However, the knots are within permissible limits and sweep does not exceed 1/4 of the diameter of the small end of the log.

Figure 5.--Two examples of hardwood logs in the Tie and Structural Grade. These are sound, but they are not clear enough to qualify in factory grades.

the point of occurrence. Sweep is permitted, provided it does not exceed one-fourth of the diameter of the small end of the log.

FIELD TESTS OF THE LOG GRADES

ANY UNIVERSAL GRADING system must be tested in the field, not only to check its effectiveness in classifying logs according to use, but also to determine the effect of local variations in the different grading factors. Hidden things such as differences in growth rate and the relationship of visible indicators of internal defect vary locally; and these must be checked. Another reason for making local tests is to familiarize operators with the grading system.

Four test-demonstrations have been made by the Northeastern Forest Experiment Station--one in Pennsylvania, one in West Virginia, and two in Maine. These field studies were designed to demonstrate the applicability of the log-grading system developed by the Forest Products Laboratory. They were also designed to test the correlation between log grade and lumber-yield value under local conditions and with relatively small quantities of logs.

Since some hardwood timber is used for specialty products such as handles and dowels, the two studies made in Maine had the additional objective of determining whether the log grades are applicable to such specialty products, which usually are made from relatively short pieces of nearly perfect wood.

At A Pennsylvania Sawmill

The first study was made at a sawmill located in western Pennsylvania. The mill, equipped with a 6-foot bandsaw, cut 15 to 20 thousand board feet of hardwood lumber per day. Lumber produced at this mill was graded on the green chain by the company lumber grader according to National Hardwood Lumber Association rules. The selection of this mill was a fortunate one because it provided an opportunity to apply log-grade specifications to black cherry, one of the few important species not covered by Forest Products Laboratory lumber-yield data. Red and black oak logs were also used in the study.

Three basic use classes--factory, structural, and local-use logs--were recognized. However, the number of structural logs taken at this mill was not sufficient to warrant testing this class. Within the other two use classes, three log grades were recognized in the factory class. The local-use class was not subdivided.

A supply of black cherry and oak logs was graded until 25 to 30 logs were accumulated in each of the three factory grades and the local-use class. The logs were sorted by grade and each grade was run through the mill separately. This made it easy to determine the lumber-grade yield of each log grade. Nearly all the lumber was sawed 4/4 inch, cut 1/8 inch heavy. Some of the oak was sawed 8/4 inch for 2 by 6's.

The test run of black cherry (table 1) showed a good correlation of log grade with lumber value. From this it can be concluded that these log-grade specifications fit black cherry very well.

There was a significant difference between the lumber value of Grade F-1 logs and Grade F-2 logs--$23.86 per thousand board feet. A similar spread in lumber values was found between Grades F-2 and F-3, and between Grade F-3 and local-use logs. Results of the test run of oak logs are shown in table 2.

At A West Virginia Sawmill

This study was conducted at a bandsaw mill in West Virginia, which produced 10 to 15 thousand board feet of hardwood lumber daily. The output was graded on the green chain by an experienced lumber grader according to the National Hardwood Lumber Association rules.

Two use classes of logs--factory and nonfactory--were recognized. No attempt was made to group the logs by class or grade. Rather, the logs were classified and graded on the bull chain as they were brought up from the log pond. Each log was identified so that lumber-grade yield could be recorded separately by logs.

The sample included 25 to 30 logs in each of the three factory grades and in the nonfactory use class. The lumber was sawed 4/4, 5/4, 6/4, and 8/4, according to the usual practice of the mill. Since this mill was not sawing tie

Table 1.--Black cherry: green lumber-grade yield per thousand board feet from various grades of logs sawed at a western Pennsylvania sawmill, 1949

Use class and log grade	Lumber grade					
	FAS	Select	No. 1 Common	No. 2 Common	No. 3 Common	Total
	Lumber volume, board-feet mill scale[1]					
Factory class						
Grade F-1	276	211	205	115	193	1,000
Grade F-2	122	137	245	190	306	1,000
Grade F-3	54	46	180	268	452	1,000
Local-use class	4	4	90	204	698	1,000
	Lumber value[2]					
Factory class						
Grade F-1	$44.16	$29.54	$20.50	$ 5.75	$ 5.79	$105.74
Grade F-2	19.52	19.18	24.50	9.50	9.18	81.88
Grade F-3	8.64	6.44	18.00	13.40	13.56	60.04
Local-use class	.64	.56	9.00	10.20	20.94	41.34

[1] Percentage of lumber yield in each lumber grade may be determined easily by pointing off the last digit in each number.

[2] Based on f.o.b. mill prices for 4/4 black cherry as follows: FAS at $160 per 1,000 board feet, Select at $140, No. 1 Common at $100, No. 2 Common at $50, and No. 3 Common at $30.

Table 2.--Red and white oak: green lumber-grade yield per thousand board feet from various grades of logs sawed at a western Pennsylvania sawmill, 1949

Use class and log grade	Lumber grade						
	FAS	Select	No. 1 Common	No. 2 Common	No. 3 Common 4/4	No. 4 Common 8/4	Total
	Lumber volume, board-feet mill scale[1]						
Factory class							
Grade F-1	403	61	254	58	102	122	1,000
Grade F-2	132	94	216	124	204	230	1,000
Grade F-3	55	64	208	147	261	265	1,000
Local-use class	--	9	64	82	497	348	1,000
	Lumber value[2]						
Factory class							
Grade F-1	$54.40	$ 7.63	$25.40	$ 3.48	$ 3.06	$ 7.32	$101.29
Grade F-2	17.82	11.75	21.60	7.44	6.12	13.80	78.53
Grade F-3	7.43	8.00	20.80	8.82	7.83	15.90	68.78
Local-use class	--	1.13	6.40	4.92	14.91	20.88	48.24

[1] Percentage of lumber yield in each lumber grade may be determined easily by pointing off the last digit in each number.

[2] Based on f.o.b. mill prices for 4/4 oak as follows: FAS at $135 per 1,000 board feet, Select at $125, No. 1 Common at $100, No. 2 Common at $60, and No. 3 Common at $30. Price for 8/4 No. 3 Common at $60.

and timber material, logs that would normally be placed in the structural use class were included in the nonfactory class.

All red and white oak logs coming into the mill were included in the sample. Table 3 shows the number of logs and volume (board-foot mill tally) by use class and log grade.

As in the Pennsylvania study, the results showed a definite correlation between log grades and lumber values (table 4). There was a differential of nearly $63 per thousand board feet between the lumber-yield value of Grade F-1 logs and nonfactory-class logs. The difference in lumber-yield value per thousand feet ranged from $19 between Grades F-1 and F-2 to $27 between Grades F-2 and F-3. These are significant differences.

To determine actual lumber value according to log grades at any one time it is necessary to apply local lumber prices that were in effect at the time. Table 5 shows the lumber prices in effect at this mill at the time of the study.

From the results of these two test-demonstrations (tables 1, 2, and 3), we find that the universal hardwood log-grading system developed by the Forest Products Laboratory satisfactorily segregates logs in these localities by lumber-yield value. Furthermore, the system is applicable to small quantities of logs.

Table 6 summarizes the findings of the test-demonstrations in Pennsylvania and West Virginia. In each test there was a significant downward trend in the yield of No. 1 Common and better lumber as the quality of the logs became poorer. Conversely, there was a significant increase in the yield of No. 2 Common and poorer lumber as the quality of the logs became poorer. A similar pattern of lumber-yield value was found.

At A Maine Handle Mill

This test was made at a plant that manufactures white ash logs into handles. The logs were graded on the log deck at the mill. Only factory-class logs were included in the study.

Table 3.--Log-run volume by use class and log grade at a West Virginia sawmill

Use class and log grade	Logs sawed	Volume	
	Number	Board feet	Percent
Factory class			
Grade F-1	10	1,777	29.0
Grade F-2	24	2,416	39.5
Grade F-3	21	1,326	21.6
Nonfactory class	12	607	9.9
Total	67	6,126	100.0

Table 4.--Lumber-grade yield per thousand board feet from various grades of oak logs sawed at a West Virginia sawmill, 1950

Use class and log grade	Lumber Grade										
	FAS	FAS one face	Select	No. 1 Common	No. 2 Common	Sound wormy	No. 3A Common	No. 3B Common	Structural items	Dunnage	Total
	Lumber yield, board-feet mill scale[1]										
Factory class											
Grade F-1	245	127	2	239	98	82	73	99	11	24	1,000
Grade F-2	126	91	--	274	160	79	116	109	44	1	1,000
Grade F-3	6	--	--	247	179	23	165	294	64	22	1,000
Nonfactory class	--	--	--	62	118	--	162	442	145	71	1,000
	Lumber value										
Factory class											
Grade F-1	$43.08	$20.99	$0.29	$25.11	$ 6.57	$ 5.34	$ 4.16	$ 3.37	$ 0.54	$ 0.62	$110.07
Grade F-2	22.12	14.68	--	27.82	10.72	2.72	6.61	3.71	2.20	.03	90.61
Grade F-3	.99	--	--	25.68	11.99	1.48	9.40	10.02	3.14	.57	63.27
Nonfactory class	--	--	--	6.20	7.91	--	9.23	15.03	7.10	1.85	47.32

[1]Percentage of lumber yield in each lumber grade may be determined easily by pointing off the last digit in each number.

Table 5.--Local prices of red oak and white oak lumber per thousand board feet, f.o.b., at time of West Virginia study

Lumber grade	4/4	5/4	6/4	8/4
FAS	$ 165	$ 175	$ 185	$ 195
FAS, one face	155	165	175	185
Selects	145	155	165	175
No. 1 Common	100	110	120	125
No. 2 Common	67	--	--	--
Sound wormy	62	64	--	67
No. 3A Common	57	--	--	--
No. 3B Common	34	36	--	--
Structural items	49	--	--	--
Dunnage	26	--	--	--

Table 6.--Summary of lumber-grade yield per thousand board feet from various grades of logs sawed in test-demonstrations at sawmills in Pennsylvania and West Virginia[1]

Use class and log grade	No. 1 Common and better[2]				No. 2 Common and poorer[2]			
	Test A	Test B	Test C	Average	Test A	Test B	Test C	Average
Factory class								
Grade F-1	692	718	613	674	308	282	387	326
Grade F-2	504	442	491	479	496	558	509	521
Grade F-3	280	327	253	287	720	673	747	713
Nonfactory class	98	73	62	78	902	927	938	922

[1] Tests referred to are as follows: Test A, black cherry at a western Pennsylvania sawmill; Test B, red and white oak at a western Pennsylvania sawmill; Test C, oak at a West Virginia sawmill.

[2] Percentage of lumber yield in each lumber-grade group may be determined by pointing off the last digit in each number.

Normal sawmill practice in this part of Maine is to produce round-edge lumber by sawing "through-and through" the log. Lumber-grade yield from this method is normally lower than the grade yield obtained by "sawing around" the log.

The sawing at this mill was done by a circular saw (1/4-inch kerf). The boards were sawed 5/4 inches thick, then were immediately planed to 1-1/8 inches. After being graded by a National Hardwood Lumber Association inspector, the lumber was kiln-dried and then cut to suitable lengths. The lumber was graded as No. 1 Common and better, No. 2 Common, and No. 3 Common. It was sorted according to the grade of the log from which it came.

Next the lumber was ripped to handle size. The handles were 31/32 inch in diameter and either 48 or 57 inches long; the 48-inch handles were cut from stock that would not yield longer handles because of defect. After ripping, the blanks were doweled on a hawker, nosed, and sanded. The yield of handles was determined at this point.

In this test a good segregation of handle yield was obtained through application of the log grades (table 7). Grade F-1 logs produced 287 more handles per thousand board feet than did Grade F-2 logs, and Grade F-2 logs produced 280 more handles per thousand board feet than did Grade F-3 logs. The spread in value of handles produced from each log

Table 7.--Yield and value of handles per thousand board feet from various white ash logs sawed "through-and through" at a Maine sawmill, 1950

Log grade	Lumber grade and length of handle								Total
	No. 1 Common and better		No. 2 Common		No. 3 Common		All three grades		
	57"	48"	57"	48"	57"	48"	57"	48"	
	Number of handle blanks								
F-1	999	107	213	18	6	0	1,218	125	1,343
F-2	526	66	337	42	76	9	939	117	1,056
F-3	115	30	234	59	250	48	639	137	776
	Value of handle blanks[1]								
F-1	$128.44		$27.00		$ 0.72				$156.16
F-2	68.40		43.80		9.84				122.04
F-3	21.00		32.80		33.84				87.64

[1]Handles valued at $0.08 for 48-inch handles and $0.12 for 57-inch handles.

Table 8.--Round-edge lumber-grade yield and value per thousand board feet from factory grades of white ash logs sawed "through-and-through" at a Maine sawmill, 1950

Log grade	Lumber grade					
	FAS	Select	No. 1 Common	No. 2 Common	No. 3 Common	Total
	Lumber volume, surface feet mill scale					
F-1	292	93	286	304	25	1,000
F-2	61	169	204	441	125	1,000
F-3	0	0	168	353	479	1,000
	Lumber value[1]					
F-1	$43.80	$12.09	$27.17	$16.72	$ 0.75	$100.53
F-2	9.15	21.97	19.38	24.26	3.75	78.51
F-3	0.0	0.0	15.96	19.42	14.37	49.75

[1]Based on f.o.b. mill prices as follows: FAS at $150 per 1,000 board feet, Select at $130, No. 1 Common at $95, No. 2 Common at $55, and No. 3 Common at $30.

Table 9.--Yield and value of handles per thousand board feet from various grades of white ash logs sawed "around" at a Maine sawmill, 1950

Log grade	Lumber grade and length of handle								Total
	No. 1 Common and better		No. 2 Common		No. 3 Common		All three grades		
	57"	48"	57"	48"	57"	48"	57"	48"	
	Number of handle blanks								
F-1	855	144	238	38	39	7	1,132	189	1,321
F-2	685	104	163	32	143	23	991	159	1,150
F-3	183	46	233	63	293	85	709	194	903
	Value of handle blanks[1]								
F-1	$114.12		$31.60		$ 5.24				$150.96
F-2	90.52		22.12		19.00				131.64
F-3	25.64		33.00		41.96				100.60

[1]Handles valued at $0.08 for 48-inch handles and $0.12 for 57-inch handles.

grade is also of practical significance. The differential in handle value amounted to $24.12 between Grades F-1 and F-2, and $34.40 between Grades F-2 and F-3.

The differential in lumber-yield values between log grades was slightly less than for handle stock, but nonetheless significant. There was a difference of $22.02 in lumber value between log grades F-1 and F-2, and $28.76 between Grades F-2 and F-3 (table 8).

Part of this test was designed to determine if sawing "around" the log would produce a greater yield of handles. The yield and value of handles from logs sawed "around" are shown in table 9. Comparison with table 7 shows that yield and value from Grade F-2 and F-3 logs were substantially greater from logs sawed "around." The yield from Grade F-1 logs was not significantly different.

This comparison is not meant to be conclusive evidence that all logs from which handle stock is produced should be sawed "around." Further studies should be made of cost and production rate before any choice is arrived at between sawing "through-and-through" and sawing "around."

At A Maine Dowel Mill

This test was also made at a Maine plant; it was conducted in a manner similar to the study of white ash handle production. In this mill the end product was bobbin dowels, 1-5/16 inches in diameter and 8-3/4 inches long. Only sugar maple logs were utilized in this test.

Approximately 25 logs in each log grade of the factory class were selected. The logs were bucked into short lengths on the log deck. Flitches were sawed to 1-3/8 inches by a standard circular saw (5/16-inch kerf). These were crosscut and ripped before entering the doweling machine to insure the greatest practical yield. The dowels were then cut to proper length.

Obviously defective dowels were discarded by inspectors at this stage of the operation. Dowels passing this first inspection were used in the test. Undoubtedly other dowels were discarded after drying and turning, but it was impractical to maintain segregation by log-grade groups all the way to the finished product.

Some segregation of yield by log grades was obtained (table 10), but the difference in yield of dowels between Grades F-1 and F-2 was small: 7.0 percent. A greater difference in yield appeared between Grades F-2 and F-3: 10.2 percent. Even though the sample may be too small to be considered conclusive, it is important to note that there was some spread between log grades in the yield of small specialty products.

Table 10.--Yield of dowels per thousand board feet, net scale, Bangor log scale, by factory log grades

Log grade	Logs used	Log scale	Total dowels	Dowels per M bd.ft.	Comparative yield of dowels
	Number	Board feet	Number	Number	Percent
F-1	24	3,668	23,600	6,434	100.0
F-2	30	3,382	20,240	5,895	93.0
F-3	27	1,771	9,440	5,330	82.8

The over-all results of this study show that log grades can be used to segregate logs by value for the production of small specialty items. However, the spread in product yield between log grades is not so great as the spread found in tests involving standard factory lumber and handle stock.

CONCLUSIONS

THE RESULTS of these test-demonstrations indicate that both the buyer and seller of logs can profit through the application of suitable quality standards. By classifying his logs according to quality, the sawmill manager can determine how far he can go in the processing of low-quality logs and, in turn, can determine what he can afford to pay for high-quality logs.

Through the use of such standards the seller of logs can determine more accurately what his logs are worth.

And the timber grower, realizing through these quality standards the greater value of high-quality material, is given an incentive to manage his forest land for high-quality logs.

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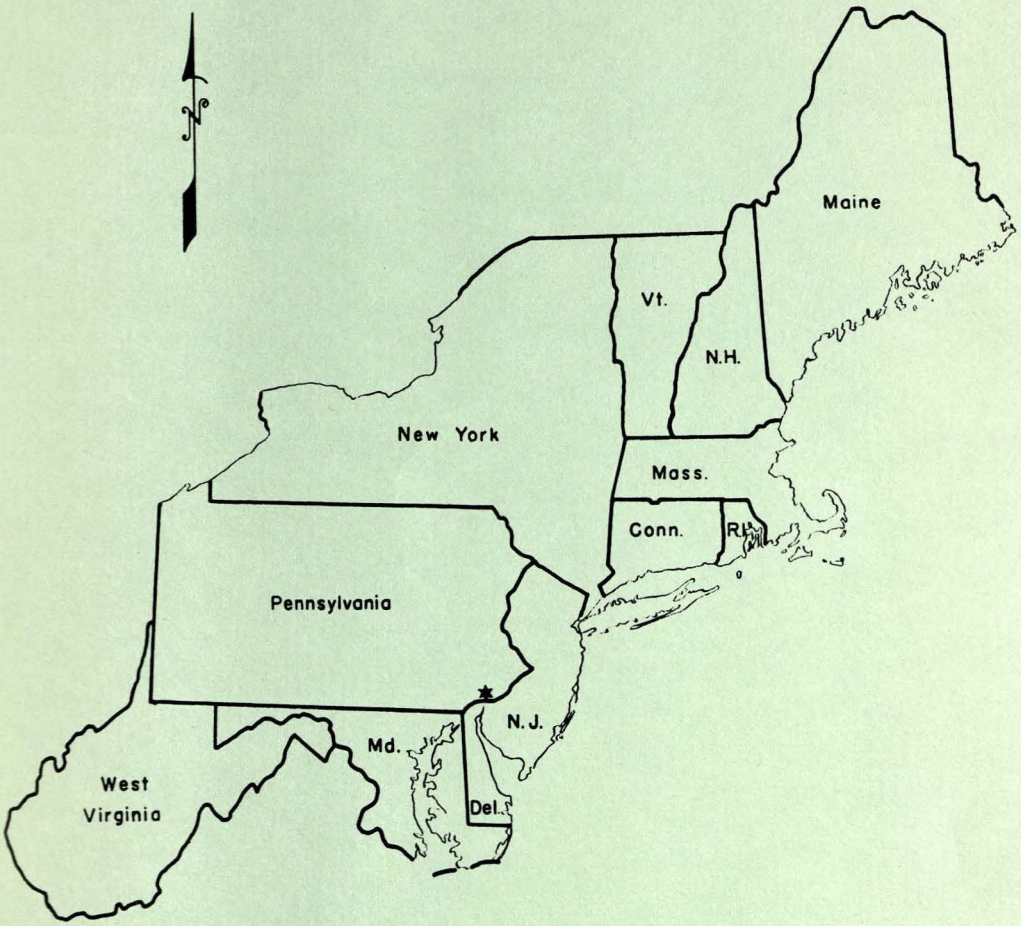

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